

# PATENT ABSTRACTS OF JAPAN

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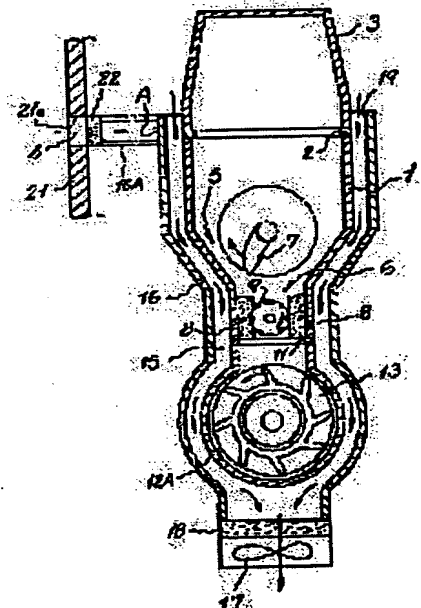
SATO NAOMOTO

## (54) DEVELOPING DEVICE

### (57)Abstract:

**PURPOSE:** To prevent the softening of toner and to stabilize an image by forming a duct for making air circulate and forcing the air to circulate.

**CONSTITUTION:** The duct 15 for making the air to circulate is formed around a toner replenishing housing (including a tube part 12A) including a toner replenishing housing part (including a sealing member 2) to which a toner replenishing container 3 is connected so that the side of the connecting part may be the upstream side of the flow of the air. In such a case, a duct armoring member 16 surrounds the periphery of the toner replenishing housing 1, and the duct 15 is formed between the housing 1 and the member 16. Furthermore, a suction fan 17 is provided at the lower end of the member 16 and actuated to be rotated by the driving force of a motor. When the fan 17 is rotated, the air flows in from an aperture 19 at the upper end of the member 16 and passes through the duct 15, and gets out of a filter 18 to the outside of the member 16. Namely, the air is forcedly circulated in the duct 15.



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3042914

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**CLAIMS**

[Claim(s)]

[Claim 1] The toner reservoir section which stores the toner which a toner supply container is connected and is filled up from this toner supply container, The toner supply case which prepared in the interior the toner supply conveyance section which conveys a toner towards the body of a development container, respectively is provided supplying the toner of the toner reservoir section. The body of a development container, It is made for a connection side with a toner supply container to become the surroundings of the toner supply case which includes at least some or the whole region of a toner supply case part where a toner supply container is connected among toner supply cases with the upstream of the flow of air. The developer which establishes a means to carry out forcible circulation of the air, and changes while forming the duct for circulating air.

[Claim 2] The developer according to claim 1 which used the toner supply case as the toner supply case of the quality of the material of high temperature conductivity.

[Claim 3] The developer according to claim 1 or 2 which used the duct as the duct with which the open air is inhaled.

[Claim 4] The developer according to claim 1 to 3 made into the suction fan who may increase an air suction force after making the means for carrying out forcible circulation of the air into the suction fan attached to a duct and detecting the toner end of the toner reservoir section in this suction fan until the condition of a toner end was canceled.

[Claim 5] The developer according to claim 1 to 4 with which the means for carrying out forcible circulation of the air was made into the suction fan attached to a duct, and only between after the toner end of the toner reservoir section is detected when it becomes beyond predetermined temperature and until the condition of a toner end is canceled made this suction fan the suction fan who does rotation actuation.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

**[0001]**

**[Industrial Application]** This invention relates to a developer with toner supply equipment.

**[0002]**

**[Description of the Prior Art]** There are some which form into a visible image the electrostatic latent image which formed the image on latent-image support, such as a photo conductor, as a toner image with image formation equipments, such as a copying machine and a printer. Although it is the developer which attains such a function, when the residue of the toner of toner reservoir circles decreases or this is lost, this is exchanged for a new toner supply container by the thing of a configuration of connecting toner supply containers, such as a toner cartridge, to this toner supply equipment, and supplying a toner to the toner reservoir section with a developer with the toner supply equipment of these.

**[0003]** At the time of exchange of this toner supply container, a toner disperses around, I hear that a perimeter becomes dirty with a toner, and the thing which mentions one of the troubles on which this kind of image formation equipment became chronic, then it have it. In this case, of course, the exchange person of a toner supply container will also become dirty with a toner.

**[0004]** Since the thing used as the light source of exposure optical system and the heat source of an anchorage device etc. is prepared in this kind of image formation equipment, if a continuation copy etc. is performed on the other hand, temperature inside the plane will rise greatly. Then, if it becomes easy to soften the toner for supply in toner supply equipment and such softening is produced, the amount of supply of a toner decreases, image concentration will fall or the detection mistake of a toner end will be produced.

**[0005]** Furthermore, if toner particles will come to weld each other and it will become a toner nucleus, if a toner becomes soft, and this adheres to a photo conductor, poor adhesion of a transfer paper and a photo conductor will be produced, a poor imprint will be caused, and image quality will become easy to deteriorate.

**[0006]**

**[Problem(s) to be Solved by the Invention]** The purpose of this invention is to prevent softening of the toner accompanying a temperature rise inside the plane, and make a good image stabilized at the time of exchange of a toner supply container, while making it not disperse a toner.

**[0007]**

**[Means for Solving the Problem]** The toner reservoir section which stores the toner which a toner supply container is connected and is filled up from this toner supply container in order that this invention may attain the above-mentioned purpose,

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to a developer with toner supply equipment.

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**PRIOR ART**

[Description of the Prior Art] There are some which form into a visible image the electrostatic latent image which formed the image on latent-image support, such as a photo conductor, as a toner image with image formation equipments, such as a copying machine and a printer. Although it is the developer which attains such a function, when the residue of the toner of toner reservoir circles decreases or this is lost, this is exchanged for a new toner supply container by the thing of a configuration of connecting toner supply containers, such as a toner cartridge, to this toner supply equipment, and supplying a toner to the toner reservoir section with a developer with the toner supply equipment of these.

[0003] At the time of exchange of this toner supply container, a toner disperses around, I hear that a perimeter becomes dirty with a toner, and the thing which mentions one of the troubles on which this kind of image formation equipment became chronic, then it have it. In this case, of course, the exchange person of a toner supply container will also become dirty with a toner.

[0004] Since the thing used as the light source of exposure optical system and the heat source of an anchorage device etc. is prepared in this kind of image formation equipment, if a continuation copy etc. is performed on the other hand, temperature inside the plane will rise greatly. Then, if it becomes easy to soften the toner for supply in toner supply equipment and such softening is produced, the amount of supply of a toner decreases, image concentration will fall or the detection mistake of a toner end will be produced.

[0005] Furthermore, if toner particles will come to weld each other and it will become a toner nucleus, if a toner becomes soft, and this adheres to a photo conductor, poor adhesion of a transfer paper and a photo conductor will be produced, a poor imprint will be caused, and image quality will become easy to deteriorate.

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**EFFECT OF THE INVENTION**

[Effect of the Invention] According to the developer of this invention according to claim 1, what it can avoid dispersing a toner and disgraces a perimeter, an exchange person, etc. of the exchange section with a toner at the time of exchange of a toner supply container is lost. Moreover, since softening of a toner is prevented even if the temperature of the toner supply section rises, the fall of the amount of toner supply and melting of toner particles can be prevented, it is hard coming to generate a poor imprint, and irrespective of the height of the temperature, it is stabilized and a good image can be obtained at any time.

[0044] According to the developer according to claim 2, the \*\*\*\* effectiveness of a toner supply case can be heightened and an internal toner can be cooled efficiently.

[0045] According to the developer according to claim 3, the cooling effect of the toner in a toner supply case can be heightened greatly, and a suction fan is also the thing of small capacity and comes to end.

[0046] According to the developer according to claim 4, the toner scattering prevention effectiveness at the time of exchange of a toner supply container can be heightened greatly.

[0047] According to the developer according to claim 5, a suction fan's noise generating time amount can be made restrictive, and it also becomes much more power-saving.

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**TECHNICAL PROBLEM**

[Problem(s) to be Solved by the Invention] The purpose of this invention is to prevent softening of the toner accompanying a temperature rise inside the plane, and make a good image stabilized at the time of exchange of a toner supply container, while making it not disperse a toner.

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**MEANS**

[Means for Solving the Problem] The toner reservoir section which stores the toner which a toner supply container is connected and is filled up from this toner supply container in order that this invention may attain the above-mentioned purpose, The toner supply case which prepared in the interior the toner supply conveyance section which conveys a toner towards the body of a development container, respectively is provided supplying the toner of the toner reservoir section. The body of a development container, It is made for a connection side with a toner supply container to become the surroundings of the toner supply case which includes at least some or the whole region of a toner supply case part where a toner supply container is connected among toner supply cases with the upstream of the flow of air. While forming the duct for circulating air, the configuration which established a means to carry out forcible circulation of the air is proposed.

[0008] In addition, it is effective if a toner supply case is used as the toner supply case of the quality of the material of high temperature conductivity.

[0009] Moreover, it is effective if a duct is used as the duct with which the open air is inhaled.

[0010] Furthermore, if it is the suction fan who may increase an air suction force, it is effective after making the means for carrying out forcible circulation of the air into the suction fan attached to a duct and detecting the toner end of the toner reservoir section in this suction fan until the condition of a toner end is canceled.

[0011] Moreover, it is effective, if the means for carrying out forcible circulation of the air is made into the suction fan attached to a duct and only between after the toner end of the toner reservoir section is detected when it becomes beyond predetermined temperature and until the condition of a toner end is canceled makes this suction fan the suction fan who does rotation actuation.

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EXAMPLE

[Example] In drawing 1, the connection set of the cartridge-like toner supply container 3 is carried out at the upper limit section of the toner supply case 1. The toner supply container 3 is what is really fabricated with synthetic resin, and it fills up with Toner T ( drawing 3 ) in this case.

[0013] As lower limit opening of the toner supply container 3 is shown in drawing 3, it is blocked by the blockade tape 4, it is in the condition which set the toner supply container 3 to the upper limit of the toner supply case 1, and if this blockade tape 4 is lengthened in the direction of arrow-head a (i.e., if it lengthens in the direction of a near side in drawing 1 ), this tape will be removed from the toner supply container 3. At this time, the toner in this toner supply container 3 falls, and it can store in the toner reservoir section 5 of the toner supply case 1. That is, the toner filled up from the toner supply container 3 is stored by this toner reservoir section 5.

[0014] The toner supply container 3 serves as the top cover of the toner reservoir section 5, connection is made a blocked state by the seal member 2 which consists of foaming polyurethane etc., and, thereby, toner scattering to the exterior from the connection after a toner supply container set is prevented. An agitator 7 is formed in the toner reservoir section 5, and blocking of the toner of the toner reservoir section 5 is prevented by carrying out the rotation drive of this in the direction of an arrow head.

[0015] The toner supply roller 9 inserted into the seal members 8 and 8 of a pair is formed in the low order of an agitator 7. Moreover, the toner churning conveyance member 13 is formed in cylinder part 12A through the seal member 11 of the lower part of the toner supply case 1. As this toner churning conveyance member 13 is shown in drawing 2, it has extended and come out towards the interior of the body 12 of a development container, and cylinder part 12A was really formed in this body 12 of a development container, and has accomplished that part.

[0016] If the developer of binary system is held and the concentration of the toner in this developer falls into the body 12 of a development container, the toner supply roller 9 will begin rotation. Then, the toner of the toner reservoir section 5 being supplied in cylinder part 12A with that toner supply roller 9, and being agitated by the toner churning conveyance member 13 of that interior, it is conveyed by these shaft orientations and put in in the body 12 ( drawing 2 ) of a development container.

[0017] Even if it is the toner supply case 1 and another object structure, even if cylinder part 12A has unification structure, it is not cared about, but anyway, it is connected with the toner supply case 1, and it can be considered that it is some toner supply cases 1. The toner supply conveyance section 6 has the toner supply roller 9, the toner churning conveyance member 13, etc., and this toner supply conveyance section 6 is formed in the interior of cylinder part 12A which accomplishes the toner supply case 1 and a part of this.

[0018] It is supplied to the peripheral surface of a developing roller 14, the toner sent by the toner churning conveyance member 13 of drawing 2 being mixed and agitated in the developer within the body 12 of a development container. Thus, it is conveyed the developer supplied on the developing roller 14 in response to supply of a toner having this developing-roller 14 top supported, and visible image-ization of the electrostatic latent image formed in the front face of the photo conductor 10 shown in drawing 4 is presented with it. in addition — although an

agitator 7, the toner supply roller 9, and toner churning conveyance member 13 grade are driven through rotation transfer members, such as a gear, by rotation of a motor — \*\* — about the driving means [ like ], it migrates to each drawing and the illustration is omitted. Moreover, a spiral can be prepared in the front face of the toner churning conveyance member 13, and it can also constitute so that it may convey agitating a toner and a carrier by this. Furthermore, the one component system developer which does not contain a carrier is held in the body 12 of a development container, and development actuation can be performed.

[0019] In the developer with such toner supply equipment, it had two big problems conventionally.

[0020] One is a toner's tending to disperse at the time of exchange of the toner supply container 3, and disgracing the perimeter of toner supply equipment, and the exchange person of a toner supply container with a toner.

[0021] It is that cause a poor imprint and image quality deteriorates more as it becomes easy to soften a toner and stated also first, when the environmental temperature besides image formation equipment and the temperature in image formation equipment rose. Especially about a high-speed machine, calorific value becomes large and it much more becomes easy to soften a toner.

[0022] This invention solves such two problems to coincidence.

[0023] That is, as the connection part side turned into the upstream of the flow of air, the duct 15 for circulating air was formed in the surroundings of the toner supply case (cylinder part 12A is included) 1 containing the toner supply case part (part of the seal member 2) to which the toner supply container 3 is connected.

[0024] The cross section where the duct sheathing member 16 surrounds the surroundings of the toner supply case 1 has accomplished tubed [ rectangular ], and the duct 15 which was mentioned above between this and the toner supply case 1 is formed.

[0025] The suction fan 17 is formed in the lower limit of the duct sheathing member 16, this is what attached the fan motor in one, and rotation actuation is carried out with the driving force of this motor. If this suction fan 17 rotates, from the opening 19 of the upper limit of the duct sheathing member 16, air will flow, and it will pass along the inside of a duct 15, and will come from a filter 18 out of the duct sheathing member 16. That is, the inside of a duct 15 is turned downward from a top, and air carries out forcible circulation. \*\* — it is the suction fan 17 who accomplishes an example of a means which attains a function [ like ]. In addition, in drawing 1, the arrow head shown in a duct 15 shows the flow direction of the air.

[0026] Air cooling of the toner supply case 1 containing cylinder part 12A is carried out by the flow of the air in such a duct 15, and the toner in the interior is cooled. Since this toner is cooled even if temperature inside the plane rises, this softening is prevented.

[0027] When removing the empty toner supply container 3 from the toner supply case 1, or carrying out the connection set of the new toner supply container at it and tearing off the blockade tape 4 ( drawing 3 ), a toner surely becomes easy to disperse. Since the toner which dispersed since the connection set section is covered with duct sheathing member 16 the very thing and air was moreover carrying out the forcible inflow in opening 19 when, and operating the suction fan 17 is drawn in the flow and it enters in a duct 15, there is no possibility of soiling the perimeter of the connection set section with a toner. In addition, the toner which rode the flow of this air is caught by the lower filter 18, and is adhered and deposited here. By such function, it no longer being emitted out of the duct sheathing member 16, and soiling a perimeter of a toner with a toner is lost.

[0028] In addition, what is depended on JP,63-124260,U etc. is conventionally proposed as what has the exhaust air section which removes \*\*\*\* in a toner supply container, and the purification section.

[0029] By the way, although the toner supply case 1 containing cylinder part 12A is covered by the duct sheathing member 16, it is it and you may make it even the body 12 of a development container shown in drawing 2 and drawing 4 cover in this example. Thus, with constituting, to the part of the body 12 of a development container, a duct will be formed, the developer within the body of a development container will be cooled, and softening of the toner of this interior is

prevented. Moreover, although the whole toner supply case 1 was covered by the duct sheathing member 16, you may make it cover only the part by the duct sheathing member 16 in this example depending on the configuration of the supply case 1. Although similarly the whole region of the toner supply case part to which a toner supply container is connected was covered by the duct sheathing member 16 by this example, you may make it cover only the part.

[0030] In addition, if it is the thing of the quality of the material of high temperature conductivity, such as a metal, and toner supply case 1 the very thing containing cylinder part 12A is constituted, even if partial, the cooling effect of that toner supply case can be heightened, and the toner of this interior can be cooled efficiently.

[0031] In drawing 1, the air which enters through opening 19 is the air in image formation equipment. On the other hand, if it is made to make the air besides image formation equipment (open air) flow in a duct 15, the cooling effect which was described in the top can be heightened further.

[0032] For example, opening 19 is changed into a closing condition, the duct extension section as shown in the duct sheathing member 16 by sign 16A is really formed, and a filter 22 is formed between this and the outer casing 21 of image formation equipment. In this case, of course about the A section of the duct sheathing member 16, it changes into an opening condition.

[0033] Thus, with constituting, from opening 21a of an outer casing 21, the open air flows in the direction of arrow-head b, and is attracted into a duct 15. Thus, the cooling effect of a toner can be further heightened by introducing the open air in a duct.

[0034] In addition, although it generates that there is nothing, a temperature sensor is formed in image formation equipment, and if it is made to operate the suction fan 17 only when this sensor detects temperature which the noise will wind always if it is having operated the suction fan 17 and which a toner softens, it can be made what limited the noise generating time amount.

[0035] Since the suitable cooling effect is acquired also in a breeze when the open air is considered as the configuration incorporated in a duct, as stated previously, the applied voltage to a suction fan may be lowered and noise level can be lowered at this rate.

[0036] When predetermined temperature to which a toner softens the suction fan 17 is detected, And if it is made to operate only between after the toner end of the toner reservoir section 5 is detected until the condition of a toner end is canceled Both softening of a toner, scattering of the toner at the time of toner supply container exchange, etc. can be prevented, and it is also that the power is saved while being able to make it the thing which winds the suction fan 17 around coincidence always and which it becomes unnecessary to have turned that there is nothing and limited the generating time amount of the noise.

[0037] About the method of detection of a toner end, it is sufficient to, form the piezo-electric sensor which can detect the existence of a toner in the toner reservoir section 5 for example. Moreover, it may be made to form a magnetometric sensor in the body 12 (drawing 4) of a development container, and in this case, this sensor is regarded as that whose toner for supply was lost, when the concentration of the toner in a developer is detected and that concentration never goes up. Furthermore, when the pattern image by the toner is formed and the concentration of this image does not go up on a photo conductor 10 (drawing 4) as a toner and a detection means, you may be a toner end and the means which is detected.

[0038] When such a toner end is detected, that is displayed on the panel control unit of the image formation equipment which is not illustrated, this display is seen to it, a frame front cover (un-illustrating) is opened to it, old and new exchange of a toner supply container is performed to it, but when this exchange is finished and a toner is filled up, the condition of a toner end which was described previously is canceled.

[0039] In addition, at the time of exchange of a toner supply container, since a scattering toner must be attracted powerfully, suitable airflow is needed. If it is made to increase the air suction force by the suction fan 17 rather than the times other than this after the toner end of the toner reservoir section 5 is detected until the condition of a toner end is canceled, a scattering toner can be made to fully attract in a duct 15.

[0040] For example, applied voltage to a suction fan is set to 12V into the time amount which prevents softening of a toner, and it is set to 24V twice as many as this at the time of exchange

of a toner supply container. Thus, you may make it switch the electrical potential difference impressed to a suction fan (in fact fan motor).

[0041] In addition, if it constitutes so that the switch may be made to turn on when a suitable switch is made to turn off, the exchange is finished, when the frame front cover mentioned above is opened that a toner supply container should be exchanged, and the covering is closed, at the time of OFF of the switch, the above-mentioned applied voltage is raised from 12V to 24V, and it can lower from 24V to 12V of origin at the time of ON of a switch.

[0042] When allowances are in the output of a fan motor, a wind may be attracted also from the body 12 of a development container, and this may be cooled. Moreover, compulsory circulation of air can be made to perform like a color developer by making a fan motor into the thing of a suitable output by what has two or more development counters to the duct of all the toner supply equipments attached to this development counter. In addition, in this example, although the cartridge-like thing was used as a toner supply container, a toner supply container not only this but bottle type etc. can be used, and it is not necessarily limited to such a thing.

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**DESCRIPTION OF DRAWINGS**

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view of the configuration sections, such as a toner supply case and a duct sheathing member, provided in the developer of this invention 1 example.

[Drawing 2] It is the side elevation of the configuration section same as the above.

[Drawing 3] It is the sectional view of the toner supply container by which a connection set is carried out at a toner supply case.

[Drawing 4] It is the front view showing the mutual physical relationship of a duct sheathing member, the body of a development container, and a photo conductor.

[Description of Notations]

1 Toner Supply Case

3 Toner Supply Container

5 Toner Reservoir Section

6 Toner Supply Conveyance Section

12 Body of Development Container

15 Duct

17 Suction Fan

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[Translation done.]

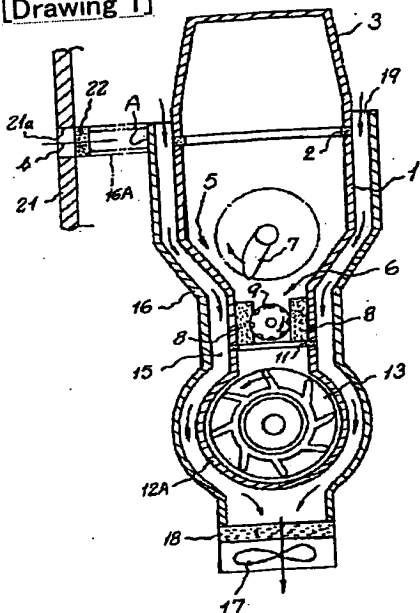
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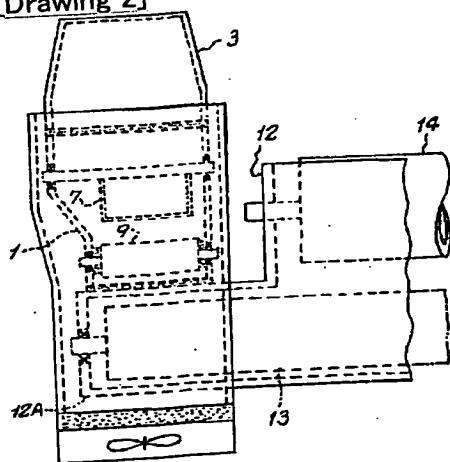
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**DRAWINGS**

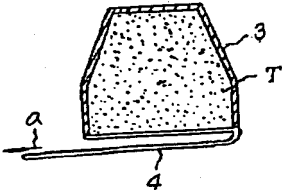
**[Drawing 1]**



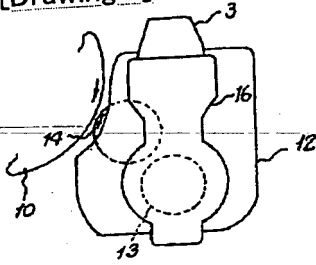
**[Drawing 2]**



**[Drawing 3]**



[Drawing 4]



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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law

[Section partition] The 2nd partition of the 6th section

[Publication date] August 6, Heisei 11 (1999)

[Publication No.] Publication number 5-19624

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[Annual volume number] Open patent official report 5-197

[Application number] Japanese Patent Application No. 3-199782

[International Patent Classification (6th Edition)]

G03G 15/08 112

[FI]

G03G 15/08 112

[Procedure revision]

[Filing Date] July 14, Heisei 10

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] Whole sentence

[Method of Amendment] Modification

[Proposed Amendment]

[Document Name] Specification

[Title of the Invention] Developer

[Claim(s)]

[Claim 1] The developer characterized by forming the duct for circulating air in the developer possessing the toner reservoir section which stores the toner which the toner supply container was connected and was filled up from this toner supply container so that the connection side of said toner reservoir section and a toner supply container may turn into the upstream of the flow of air.

[Claim 2] It is the developer characterized by connecting a toner supply container, forming the duct for circulating air in the developer possessing the toner reservoir section which stores the toner filled up from this toner supply container so that the connection side of said toner reservoir section and a toner supply container may turn into the upstream of the flow of air, and forming this duct including the surroundings of the toner reservoir section.

[Claim 3] The developer according to claim 1 or 2 which formed a means to carry out forcible circulation of the air in said duct.

[Claim 4] The developer according to claim 1 to 3 with which the open air is inhaled by said duct

[Claim 5] The developer according to claim 3 or 4 which is interlocked with detection of the

toner end of the toner reservoir section, and controls a means to carry out forcible circulation of the air.

[Detailed Description of the Invention]

[0001]

[Industrial Application] A toner supply container is connected and this invention relates to the developer possessing the toner reservoir section which stores the toner filled up from this toner supply container.

[0002]

[Description of the Prior Art] There are some which form into a visible image the electrostatic latent image which formed the image on latent-image support, such as a photo conductor, as a toner image with image formation equipments, such as a copying machine and a printer. Although it is the developer which attains such a function, when the residue of the toner of toner reservoir circles decreases or this is lost, this is exchanged for a new toner supply container by the thing of a configuration of connecting toner supply containers, such as a toner cartridge, to this toner supply equipment, and supplying a toner to the toner reservoir section with a developer with the toner supply equipment of these.

[0003] At the time of exchange of this toner supply container, a toner disperses around, I hear that a perimeter becomes dirty with a toner, and the thing which mentions one of the troubles on which this kind of image formation equipment became chronic, then it have it. In this case, the exchange person of a toner supply container also has a possibility that it may be soiled with a toner.

[0004] Since the thing used as the light source of exposure optical system and the heat source of an anchorage device etc. is prepared in this kind of image formation equipment, if a continuation copy etc. is performed on the other hand, temperature inside the plane will rise greatly. Then, if it becomes easy to soften the toner for supply in toner supply equipment and such softening is produced, the amount of supply of a toner decreases, image concentration will fall or the detection mistake of a toner end will be produced.

[0005] Furthermore, if toner particles will come to weld each other and it will become TONA 1 nucleus, if a toner becomes soft, and this adheres to a photo conductor, poor adhesion of a transfer paper and a photo conductor will be produced, a poor imprint will be caused, and image quality will become easy to deteriorate.

[0006]

[Problem(s) to be Solved by the Invention] The 1st purpose of this invention is to offer the developer it was made not to disperse a toner at the time of exchange of a toner supply container. The 2nd purpose of this invention is to offer the developer prevents softening of the toner accompanying a temperature rise inside the plane, and the good image was made to be stabilized at the time of exchange of a toner supply container while making it not disperse a toner.

[0007]

[Means for Solving the Problem] This invention proposes the developer characterized by form the duct for circulate air so that the connection side of said toner reservoir section and a toner supply container may turn into the upstream of the flow of air in the developer of the format indicated at the beginning in order to attain the 1st purpose of the above ( claim 1 ).

[0008] moreover , in order that this invention may attain said 2nd purpose , the developer characterize by form the duct for circulate air so that the connection side of said toner reservoir section and a toner supply container may turn into the upstream of the flow of air , and form this duct including the surroundings of the toner reservoir section in the developer of the format indicated at the beginning be propose ( claim 2 ) .

[0009] Moreover, it is advantageous if a means to make said duct carry out forcible circulation of the air is established in above-mentioned claim 1 or a developer given in 2 (claim 3).

[0010] Furthermore, it is effective, if it constitutes in a developer given in above-mentioned claim 1 thru/or either of 3 so that the open air may be inhaled by the duct (claim 4).

[0011] Moreover, it is effective, if it constitutes so that it may interlock and a means to carry out forcible circulation of the air may be controlled to detection of the toner end of the toner

reservoir section in above-mentioned claim 3 or a developer given in 4 (claim 5).

[0012]

[Example] The developer shown in drawing 1 possesses the toner supply case 1, and the connection set of the cartridge-like toner supply container 3 is carried out at the upper limit section of the toner supply case 1. As the toner supply container 3 is really fabricated with synthetic resin, it fills up with Toner T (drawing 3) in this case and lower limit opening of the toner supply container 3 is shown in drawing 3, it is blocked by the blockade tape 4, it is in the condition which set the toner supply container 3 to the upper limit of the toner supply case 1, and if this blockade tape 4 is lengthened in the direction of arrow-head a, this tape will be removed from the toner supply container 3. At this time, the toner in this toner supply container 3 falls, and it can store in the toner reservoir section 5 of the toner supply case 1. Thus, the toner supply container 3 is connected and the illustrated developer has the toner reservoir section 5 in which the toner filled up from this toner supply container 3 is stored.

[0013] The toner supply container 3 serves as the top cover of the toner supply case 1, both connection is made a blocked state by the seal member 2 which consists of foaming polyurethane etc., and, thereby, toner scattering to the exterior from the connection after a toner supply container set is prevented. An agitator 7 is formed in the toner reservoir section 5, and blocking of the toner of the toner reservoir section 5 is prevented by carrying out the rotation drive of this in the direction of an arrow head.

[0014] The toner supply roller 9 inserted into the seal members 8 and 8 of a pair is formed in the low order of an agitator 7. Moreover, the toner churning conveyance member 13 is formed in cylinder part 12A through the seal member 11 of the lower part of the toner supply case 1. As this toner churning conveyance member 13 is shown in drawing 2, it has extended and come out towards the interior of the body 12 of a development container, and cylinder part 12A was really formed in this body 12 of a development container, and has accomplished that part.

[0015] If the developer of binary system is held and the concentration of the toner in this developer falls into the body 12 of a development container, the toner supply roller 9 will begin rotation. Then, the toner of the toner reservoir section 5 being supplied in cylinder part 12A with that toner supply roller 9, and being agitated by the toner churning conveyance member 13 of that interior, it is conveyed by these shaft orientations and put in the body 12 (drawing 2) of a development container.

[0016] Even if it is the toner supply case 1 and another object structure, even if cylinder part 12A has unification structure, it is not cared about, but anyway, is connected with the toner supply case 1, and makes some toner supply cases 1. The toner supply conveyance section 6 has the toner supply roller 9, the toner churning conveyance member 13, etc., and this toner supply conveyance section 6 is formed in the interior of the toner supply case 1 which has cylinder part 12A. Thus, the toner supply conveyance section 6 which conveys a toner towards the body 12 of a development container is formed in the interior of the toner supply case 1, respectively, supplying the toner of the above-mentioned toner reservoir section 5 and its toner reservoir section 5.

[0017] It is supplied to the peripheral surface of a developing roller 14, the toner sent by the toner churning conveyance member 13 shown in drawing 2 being mixed and agitated in the developer within the body 12 of a development container. Thus, it is conveyed the developer supplied on the developing roller 14 in response to supply of a toner having this developing-roller 14 top supported, and visible image-ization of the electrostatic latent image formed in the front face of the photo conductor 10 shown in drawing 4 is presented with it. In addition — although an agitator 7, the toner supply roller 9, and toner churning conveyance member 13 grade are driven through rotation transfer members, such as a gear, by rotation of a motor — \*\* — about the driving means [ like ], it migrates to each drawing and the illustration is omitted. Moreover, a spiral can be prepared in the front face of the toner churning conveyance member 13, and it can also constitute so that it may convey agitating a toner and a carrier by this. Furthermore, the one component system developer which does not contain a carrier is held in the body 12 of a development container, and development actuation can be performed.

[0018] In the conventional developer with such toner supply equipment, it had two big problems.

[0019] One is that there is a possibility of a toner tending to disperse at the time of exchange of the toner supply container 3, and disgracing the perimeter of toner supply equipment and the exchange person of a toner supply container with a toner.

[0020] It is that cause a poor imprint and image quality deteriorates more as it becomes easy to soften a toner and stated also first, when the environmental temperature besides image formation equipment and the temperature in image formation equipment rose. Especially about a high-speed machine, calorific value becomes large and it much more becomes easy to soften a toner.

[0021] The developer of this example solves such two problems to coincidence.

[0022] First, the duct 15 for circulating air so that the connection side of the toner reservoir section 5 and the toner supply container 3 may turn into the upstream of the flow of air is formed. By this configuration, it can prevent that a toner disperses at the time of exchange of the toner supply container 3. And the above-mentioned duct 15 is formed including the surroundings of the toner reservoir section 5, and can prevent softening of the toner in the toner reservoir section 5 by this. It is made for the connection part side to become the surroundings of the toner supply case (cylinder part 12A is included) 1 containing the toner supply case part (part of the seal member 2) to which the toner supply container 3 is connected with the upstream of the flow of air in the illustrated example. The duct 15 for circulating air is formed, the cross section where the duct sheathing member 16 surrounds the surroundings of the toner supply case 1 has accomplished tubed [ rectangular ], and the above-mentioned duct 15 is formed between this and the toner supply case 1.

[0023] The suction fan 17 is formed in the lower limit of the duct sheathing member 16, this is what attached the fan motor in one, and rotation actuation is carried out with the driving force of this motor. If this suction fan 17 rotates, from the opening 19 of the upper limit of the duct sheathing member 16, air will flow, and it will pass along the inside of a duct 15, and will come from a filter 18 out of the duct sheathing member 16. That is, the inside of a duct 15 is turned downward from a top, and air carries out forcible circulation. \*\* — it is the suction fan 17 who accomplishes an example of a means which attains a function [ like ], and the arrow head shown in a duct 15 shows the flow direction of the air in drawing 1. Thus, a means to carry out forcible circulation of the air is formed in the duct 15 at the developer of this example.

[0024] Air cooling of the toner supply case 1 containing cylinder part 12A is carried out by the flow of the air in such a duct 15, and the toner in the interior is cooled. Since this toner is cooled even if temperature inside the plane rises, this softening is prevented.

[0025] When removing the empty toner supply container 3 from the toner supply case 1, or carrying out the connection set of the new toner supply container at it and tearing off the blockade tape 4 (drawing 3), a toner surely becomes easy to disperse. Since the toner which dispersed since the connection set section is covered with duct sheathing member 16 the very thing and air was moreover carrying out the forcible inflow in opening 19 when, and operating the suction fan 17 is drawn in the flow and it enters in a duct 15, there is no possibility of soiling the perimeter of the connection set section with a toner. The toner which rode the flow of this air is caught by the lower filter 18, and is adhered and deposited here. By such function, it no longer being emitted out of the duct sheathing member 16, and soiling a perimeter of a toner with a toner is lost.

[0026] In addition, what is depended on JP,63-124260,U etc. is conventionally proposed as what has the exhaust air section which removes \*\*\*\* in a toner supply container, and the purification section.

[0027] By the way, although the toner supply case 1 containing cylinder part 12A is covered by the duct sheathing member 16, it is it and you may make it even the body 12 of a development container shown in drawing 2 and drawing 4 cover in this example. Thus, with constituting, to the part of the body 12 of a development container, a duct will be formed, the developer within the body of a development container will be cooled, and softening of the toner of this interior is prevented. Moreover, although the whole toner supply case 1 was covered by the duct sheathing member 16, you may make it cover only the part by the duct sheathing member 16 in this example depending on the configuration of the supply case 1. Although similarly the whole region

of the toner supply case part to which a toner supply container is connected was therefore covered to the duct sheathing member 16 by this example, you may make it cover only the part. It is desirable to form the duct 15 to circulate air around the toner supply case 1 which, in short, includes at least some or the whole region of a toner supply case part where the toner supply container 3 is connected among the body 12 of a development container and the toner supply case 1, as a connection side with the toner supply container 3 turns into the upstream of the flow of air.

[0028] Moreover, if it is the thing of the quality of the material of high temperature conductivity, such as a metal, and toner supply case 1 the very thing is constituted, even if partial, the cooling effect of that toner supply case can be heightened, and the toner of this interior can be cooled efficiently.

[0029] In drawing 1, the air which enters through opening 19 is the air in image formation equipment. On the other hand, if the air besides image formation equipment (open air) is inhaled by the duct 15, the cooling effect which was described in the top can be heightened further.

[0030] For example, opening 19 is changed into a closing condition, the duct extension section as shown in the duct sheathing member 16 by sign 16A is really formed, and a filter 22 is formed between this and the outer casing 21 of image formation equipment. In this case, of course about the A section of the duct sheathing member 16, it changes into an opening condition.

[0031] Thus, with constituting, from opening 21a of an outer casing 21, the open air flows in the direction of arrow-head b, and is attracted into a duct 15. Thus, further, the cooling effect of the toner in the toner supply case 1 can be heightened, and the suction fan 17 is also the thing of small capacity, and can be managed now with introducing the open air in a duct.

[0032] Moreover, although it generates that there is nothing, a temperature sensor is formed in image formation equipment, and if it is made to operate the suction fan 17 only when this sensor detects temperature which the noise will wind always if it is having operated the suction fan 17 and which a toner softens, it can be made what limited the noise generating time amount.

[0033] Since the suitable cooling effect is acquired also in a breeze when the open air is considered as the configuration incorporated in a duct, as stated previously, the applied voltage to a suction fan may be lowered and noise level can be lowered at this rate.

[0034] The suction fan 17 is accepted after the toner end of the toner reservoir section 5 is detected when predetermined temperature which a toner softens is detected and until the condition of a toner end is canceled, and he is operated. Then, both softening of a toner, scattering of the toner at the time of toner supply container exchange, etc. can be prevented, and it is also that the power is saved while being able to make it the thing which winds the suction fan 17 around coincidence always and which it becomes unnecessary to have turned that there is nothing and limited the generating time amount of the noise.

[0035] About the method of detection of a toner end, it is sufficient to, form the piezo-electric sensor which can detect the existence of a toner in the toner reservoir section 5 for example. Moreover, it may be made to form a magnetometric sensor in the body 12 (drawing 4) of a development container, and in this case, this sensor is regarded as that whose toner for supply was lost, when the concentration of the toner in a developer is detected and that concentration never goes up. Furthermore, when the pattern image by the toner is formed and the concentration of this image does not go up on a photo conductor 10 (drawing 4) as a toner and a detection means, you may be a toner end and the means which is detected.

[0036] When such a toner end is detected, that is displayed on the panel control unit of the image formation equipment which is not illustrated, this display is seen to it, a frame front cover (un-illustrating) is opened to it, old and new exchange of a toner supply container is performed to it, but when this exchange is finished and a toner is filled up, the condition of a toner end which was described previously is canceled.

[0037] In addition, at the time of exchange of a toner supply container, since a scattering toner must be attracted powerfully, suitable airflow is needed. If it is made to increase the air suction force by the suction fan 17 rather than the times other than this after the toner end of the toner reservoir section 5 is detected until the condition of a toner end is canceled, a scattering toner can be made to fully attract in a duct 15.

[0038] For example, applied voltage to a suction fan is set to 12V into the time amount which prevents softening of a toner, and it is set to 24V twice as many as this at the time of exchange of a toner supply container. Thus, you may make it switch the electrical potential difference impressed to a suction fan (in fact fan motor).

[0039] In addition, if it constitutes so that the switch may be made to turn on when a suitable switch is made to turn off, the exchange is finished, when the frame front cover mentioned above is opened that a toner supply container should be exchanged, and the covering is closed, at the time of OFF of the switch, the above-mentioned applied voltage is raised from 12V to 24V, and it can lower from 24V to 12V of origin at the time of ON of a switch.

[0040] As mentioned above, it can consider as the suction fan 17 who may increase an air suction force, and the toner scattering prevention effectiveness at the time of exchange of the toner supply container 3 can be raised by this after making the means for carrying out forcible circulation of the air into the suction fan 17 attached to a duct 15 and detecting the toner end of the toner reservoir section 5 in this suction fan 17 until the condition of a toner end is canceled.

[0041] Moreover, it is while making the means for carrying out forcible circulation of the air into the suction fan 17 attached to a duct 15, Only between after the toner end of the toner reservoir section 5 is detected when it becomes beyond predetermined temperature and until the condition of a toner end is canceled can make this suction fan 17 the suction fan who does rotation actuation, by this configuration, the suction fan's 17 noise generating time amount can be made restrictive, and, moreover, power-saving can also be attained.

[0042] As mentioned above, the prevention effectiveness of toner scattering and the depressor effect of noise generating can be heightened by constituting so that detection of the toner end of the toner reservoir section 5 may be interlocked with and a means to carry out forcible circulation of the air may be controlled.

[0043] When allowances are in the output of a fan motor, a wind may be attracted also from the body 12 of a development container, and this may be cooled. Moreover, compulsory circulation of air can be made to perform like a color developer by making a fan motor into the thing of a suitable output by what has two or more development counters to the duct of all the toner supply equipments attached to this development counter. In addition, in this example, although the cartridge-like thing was used as a toner supply container, a toner supply container not only this but bottle type etc. can be used, and it is not necessarily limited to such a thing.

[0044]

[Effect of the Invention] According to the developer according to claim 1, what it can avoid dispersing a toner and disgraces a perimeter, an exchange person, etc. of the exchange section with a toner at the time of exchange of a toner supply container can be prevented.

[0045] While being able to avoid dispersing a toner at the time of exchange of a toner supply container according to the developer according to claim 2, Since softening of a toner is prevented even if the surrounding temperature of the toner reservoir section rises, the fall of the amount of toner supply and melting of toner particles can be prevented, it is hard coming to generate a poor imprint, and irrespective of the height of the temperature, it is stabilized and a good image can be obtained at any time.

[0046] According to the developer according to claim 3, air can be circulated into a duct certainly and effectively, and each above-mentioned effectiveness can be made into a much more positive thing.

[0047] According to the developer according to claim 4, the cooling effect of the toner in a toner supply case can be heightened greatly, and a suction fan is also the thing of small capacity and comes to end.

[0048] According to the developer according to claim 5, the toner scattering prevention effectiveness at the time of exchange of a toner supply container can be heightened greatly, it can become possible to make restrictive noise generating time amount of a means to circulate air moreover, and still much more power-saving can also be attained.

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view of the configuration sections, such as a toner supply case

and a duct sheathing member, provided in the developer of this invention 1 example.

[Drawing 2] It is the side elevation of the configuration section same as the above.

[Drawing 3] It is the sectional view of the toner supply container by which a connection set is carried out at a toner supply case.

[Drawing 4] It is the front view showing the mutual physical relationship of a duct sheathing member, the body of a development container, and a photo conductor.

[Description of Notations]

3 Toner Supply Container

5 Toner Reservoir Section

15 Duct

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[Translation done.]

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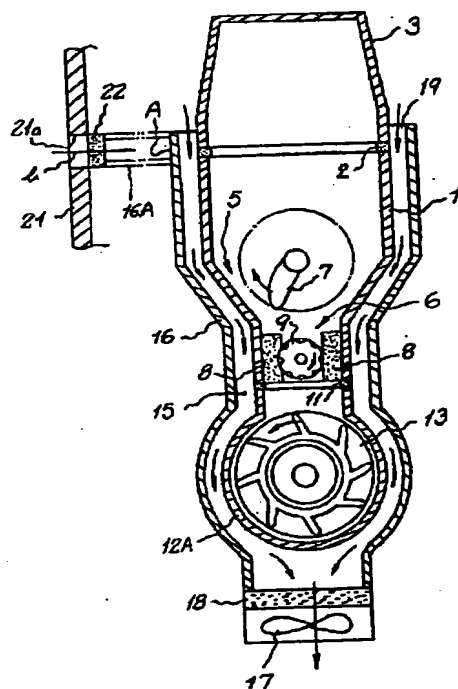
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(54)【発明の名称】 現像装置

(57)【要約】

【目的】 トナー補給容器の交換時にトナーを飛散させないようにすると共に、機内の温度上昇に伴うトナーの軟化を防止して、良質な画像を安定して得られるようにすることである。

【構成】 トナー補給容器3と、トナー補給管体1との接続部から、トナー攪拌搬送部材13を位置させた筒部12Aまでのトナー補給管体部の周りに、ダクト外装部材16でダクト15を形成し、このダクト15の下部に吸引ファン17を設けて、この回転作動により、ダクト15に空気を強制流通させる。





## 【特許請求の範囲】

【請求項1】 トナー補給容器が接続され、このトナー補給容器から補充されるトナーを貯留するトナー貯留部と、トナー貯留部のトナーを供給しつつ、現像容器本体に向けてトナーを搬送するトナー供給搬送部とを内部にそれぞれ設けたトナー補給筐体を具備し、現像容器本体と、トナー補給筐体とのうち、少なくとも、トナー補給容器が接続されるトナー補給筐体部分の一部又は全域を含むトナー補給筐体の周りに、トナー補給容器との接続部側が空気の流れの上流側となるようにして、空気を流通させるためのダクトを形成すると共に、その空気を強制流通させる手段を設けて成る現像装置。

【請求項2】 トナー補給筐体を、高熱伝導率の材質のトナー補給筐体とした請求項1に記載の現像装置。

【請求項3】 ダクトを、外気が吸い込まれるダクトとした請求項1又は2に記載の現像装置。

【請求項4】 空気を強制流通させるための手段を、ダクトに付設される吸引ファンとし、この吸引ファンを、トナー貯留部のトナーエンドが検出されてから、トナーエンドの状態が解消されるまでの間、空気吸引力を増大させ得る吸引ファンとした請求項1乃至3のいずれかに記載の現像装置。

【請求項5】 空気を強制流通させるための手段を、ダクトに付設される吸引ファンとし、この吸引ファンを、所定温度以上となったとき、及び、トナー貯留部のトナーエンドが検出されてから、トナーエンドの状態が解消されるまでの間のみ、回転作動する吸引ファンとした請求項1乃至4のいずれかに記載の現像装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、トナー補給装置をもつ現像装置に関するものである。

## 【0002】

【従来の技術】 複写機、プリンタ等の画像形成装置で、感光体などの潜像担持体上に作像した静電潜像をトナー像として可視像化するものがある。このような機能達成するものが現像装置であるが、このうちのトナー補給装置をもつ現像装置で、このトナー補給装置にトナーカートリッジなどのトナー補給容器を接続してトナー貯留部にトナーを補充する構成のものでは、トナー貯留部のトナーの残量が少なくなり、或いはこれが無くなったとき、これを新たなトナー補給容器と交換している。

【0003】 この種の画像形成装置の慢性化した問題点の一つを挙げるものとすれば、それは、かかるトナー補給容器の交換時に、トナーが周囲に飛散し、周囲がトナーで汚れるということである。この場合、勿論、トナー補給容器の交換者も、トナーで汚れることになる。

【0004】 一方、この種の画像形成装置内には露光光学系の光源や、定着装置などの熱源となるものが設けられているため、連続コピーなどを行うと、機内温度が大

きく上昇する。すると、トナー補給装置内の補給用トナーが軟化し易くなり、このような軟化を生じると、トナーの補給量が少なくなり、画像濃度が低下したり、或いは、トナーエンドの検出ミスを生じたりする。

【0005】 更に、トナーが軟化すると、トナー粒子同士が溶着し合うようになって、トナー核となり、これが感光体に付着すると、転写紙と感光体との密着不良を生じ、転写不良を起こして、画質が悪化し易くなる。

## 【0006】

【発明が解決しようとする課題】 本発明の目的は、トナー補給容器の交換時に、トナーを飛散させないようにすると共に、機内の温度上昇に伴うトナーの軟化を防止して、良質な画像を安定して得られるようにすることにある。

## 【0007】

【課題を解決するための手段】 本発明は、上記目的を達成するため、トナー補給容器が接続され、このトナー補給容器から補充されるトナーを貯留するトナー貯留部と、トナー貯留部のトナーを供給しつつ、現像容器本体に向けてトナーを搬送するトナー供給搬送部とを内部にそれぞれ設けたトナー補給筐体を具備し、現像容器本体と、トナー補給筐体とのうち、少なくとも、トナー補給容器が接続されるトナー補給筐体部分の一部又は全域を含むトナー補給筐体の周りに、トナー補給容器との接続部側が空気の流れの上流側となるようにして、空気を流通させるためのダクトを形成すると共に、その空気を強制流通させる手段を設けた構成を提案する。

【0008】 なお、トナー補給筐体を、高熱伝導率の材質のトナー補給筐体とすると効果的である。

【0009】 又、ダクトを、外気が吸い込まれるダクトとすると効果的である。

【0010】 更に、空気を強制流通させるための手段を、ダクトに付設される吸引ファンとし、この吸引ファンを、トナー貯留部のトナーエンドが検出されてから、トナーエンドの状態が解消されるまでの間、空気吸引力を増大させ得る吸引ファンとすると効果的である。

【0011】 又、空気を強制流通させるための手段を、ダクトに付設される吸引ファンとし、この吸引ファンを、所定温度以上となったとき、及び、トナー貯留部のトナーエンドが検出されてから、トナーエンドの状態が解消されるまでの間のみ、回転作動する吸引ファンとすると効果的である。

## 【0012】

【実施例】 図1において、トナー補給筐体1の上端部には、カートリッジ状のトナー補給容器3が接続セットされるようになっている。トナー補給容器3は、例えば合成樹脂で一体成形されるものとなっていて、このケース内にはトナーT(図3)が充填されている。

【0013】 トナー補給容器3の下端開口部は、図3に示すように、封鎖テープ4によって封鎖されており、ト

ナー補給容器3をトナー補給管体1の上端にセットした状態で、かかる封鎖テープ4を矢印a方向に引くと、すなわち、図1において、例えば手前側方向に引くと、かかるテープはトナー補給容器3より剥がされる。このとき、該トナー補給容器3内のトナーが落下し、トナー補給管体1のトナー貯留部5内に貯められる。すなわち、トナー補給容器3から補充されるトナーが、かかるトナー貯留部5に貯留されるのである。

【0014】トナー補給容器3は、トナー補給管体1の上蓋を兼ねており、両者の接続部は発泡ポリウレタン等より成るシール部材2により封鎖状態にされ、これにより、トナー補給容器セット後の接続部からの外部へのトナー飛散が防止される。トナー貯留部5には、アジテータ7が設けられ、これが矢印方向に回転駆動されることにより、トナー貯留部5のトナーのブロッキングが防止される。

【0015】アジテータ7の下位には一対のシール部材8、8に挟まれたトナー補給ローラ9が設けられている。又、トナー補給管体1の下部の、シール部材11を介した筒部12A内には、トナー攪拌搬送部材13が設けられている。このトナー攪拌搬送部材13は、図2に示すように、現像容器本体12の内部に向けて延び出ている。筒部12Aは、この現像容器本体12に一体形成され、その一部を成している。

【0016】現像容器本体12内には、二成分系の現像剤が収容されていて、この現像剤中のトナーの濃度が低下すると、トナー補給ローラ9が回転を始めるようになっている。すると、トナー貯留部5のトナーは、そのトナー補給ローラ9により筒部12A内に供給され、その内部のトナー攪拌搬送部材13により攪拌されつつ、この軸方向に搬送され、現像容器本体12（図2）内に入れられる。

【0017】筒部12Aは、トナー補給管体1と別体構造であっても、一体化構造となっても構わず、いずれにしても、トナー補給管体1とつながるものであり、トナー補給管体1の一部と見做すことができる。トナー供給搬送部6はトナー補給ローラ9やトナー攪拌搬送部材13などを有し、かかるトナー供給搬送部6は、トナー補給管体1や、これの一部を成す筒部12Aの内部に設けられているのである。

【0018】図2のトナー攪拌搬送部材13によって送られたトナーは、現像容器本体12内の現像剤中に混合され、攪拌されつつ、現像ローラ14の周面に供給される。このようにしてトナーの供給を受けて現像ローラ14上に供給された現像剤は、この現像ローラ14上を担持されつつ搬送され、図4に示す感光体10の表面に形成された静電潜像の可視像化に供される。なお、アジテータ7、トナー補給ローラ9、トナー攪拌搬送部材13等は、モータの回転によってギアなどの回転伝達部材を介して駆動されるようになっているのであるが、かよう

な駆動手段については、各図にわたって、その図示を省略してある。また、トナー攪拌搬送部材13の表面に例えばスパイラルを設け、これによってトナーとキャリアを攪拌しながら搬送するように構成することもできる。さらに現像容器本体12内に、キャリアを含まない一成分系現像剤を収容して現像動作を行うようにすることもできる。

【0019】このようなトナー補給装置をもつ現像装置においては、従来より、二つの大きな問題を有していた。

【0020】一つは、トナー補給容器3の交換時にトナーが飛散し易く、トナー補給装置の周囲や、トナー補給容器の交換者を、トナーで汚したりすることである。

【0021】今一つは、画像形成装置外の環境温度や、画像形成装置内の温度が上昇すると、トナーが軟化し易くなり、初めにも述べたように、転写不良を起こしたりして、画質が悪化することである。特に、高速機については、発熱量が大きくなり、一層トナーが軟化し易くなる。

【0022】本発明は、このような二つの問題を同時に解決したものである。

【0023】すなわち、トナー補給容器3が接続されるトナー補給管体部分（シール部材2の部位）を含むトナー補給管体（筒部12Aを含む）1の周りに、その接続部位の側が空気の流れの上流側となるようにして、空気を流通させるためのダクト15を形成するようにしたのである。

【0024】ダクト外装部材16は、トナー補給管体1の周りを包囲する、断面が方形の筒状を成していて、これとトナー補給管体1との間に、上述したようなダクト15が形成されるのである。

【0025】ダクト外装部材16の下端には吸引ファン17が設けられ、これはファンモータを一体的に付設したのとなっていて、このモータの駆動力により回転作動される。この吸引ファン17が回転すると、ダクト外装部材16の上端の開口19より空気が流入し、ダクト15内を通過して、フィルタ18から、ダクト外装部材16外に出る。すなわち、ダクト15内を上から下へ向けて空気が強制流通するのである。かような機能を達成する手段の一例を成すものが吸引ファン17である。なお、図1において、ダクト15内に示される矢印は、その空気の流れの方向を示す。

【0026】このようなダクト15内の空気の流れによって、筒部12Aを含むトナー補給管体1が空冷され、その内部にあるトナーが冷やされる。機内温度が上昇したりしても、かかるトナーが冷やされるので、この軟化が防止されるのである。

【0027】空のトナー補給容器3をトナー補給管体1から外したり、新たなトナー補給容器を、それに接続セットして、封鎖テープ4（図3）を引き剥がしたりする

5  
とき、どうしても、トナーが飛散し易くなる。このよう  
なときに、吸引ファン17を作動させておけば、その接  
続セット部はダクト外装部材16自体に覆われていて、  
しかも、開口19において、空気が強制流入しているの  
で、飛散したトナーはその流れに引き込まれ、ダクト1  
5内に入ってしまうので、接続セット部周囲をトナーで  
汚すおそれがない。なお、この空気の流れに乗ったトナ  
ーは、下部のフィルタ18に捕らえられ、ここに付着し  
て堆積する。このような機能によって、トナーはダクト  
外装部材16外には放出されなくなり、周囲をトナーで 10  
汚すことがなくなる。

【0028】なお、トナー補給容器内の粉塵を除去する  
排気部と、浄化部とを有するものとして、従来、実開昭  
63-124260号公報などによるものが提案されて  
いる。

【0029】ところで、本例においては、ダクト外装部  
材16により、筒部12Aを含むトナー補給管体1を覆  
うようにしたものであるが、この他、それで、図2及び  
図4に示す現像容器本体12までも、覆うようにしてし  
まっても良い。このように構成することで、現像容器本  
体12の部位までも、ダクトが形成され、現像容器本体  
内の現像剤が冷やされることになり、この内部のトナ  
ーの軟化が防止される。また本例では、トナー補給管体1  
の全体をダクト外装部材16によって覆ったが、補給管  
体1の構成によっては、その一部だけをダクト外装部材  
16によって覆うようにしてもよい。同様に、本例では  
トナー補給容器が接続されるトナー補給管体部分の全域  
をダクト外装部材16によって覆ったが、その一部だけ  
を覆うようにしてもよい。

【0030】なお、筒部12Aを含むトナー補給管体1 30  
自体を金属等の高熱伝導率の材質のもので構成すると、  
たとえ、部分的であっても、そのトナー補給管体の冷却  
効果を高めることができ、この内部のトナーを効率的に  
冷やすことができる。

【0031】図1において、開口19を通して入る空気  
は、画像形成装置内の空気である。これに対し、画像形  
成装置外の空気（外気）をダクト15内に流入させるよ  
うにすると、上で述べたような冷却効果を一層高めるこ  
とができる。

【0032】例えば、開口19を閉鎖状態にしてしま  
い、ダクト外装部材16に符号16Aで示すようなダク  
ト延伸部を一体形成し、これと、画像形成装置の外装板  
21との間にフィルタ22を設ける。この場合、勿論、  
ダクト外装部材16のA部については開口状態にする。

【0033】このように構成することで、外装板21の  
開口21aより外気が矢印b方向に流入し、ダクト15  
内へと吸引される。このように、ダクト内に外気を導入  
することで、一層、トナーの冷却効果を高めることが  
できるのである。

【0034】なお、吸引ファン17を作動させたままと 50

すると、騒音が、のべつまなく発生するが、画像形成  
装置内に温度センサを設け、トナーが軟化するような温  
度を、かかるセンサが検出したときのみ、吸引ファン1  
7を作動させるようにすると、その騒音発生時間を限定  
したものにすることができる。

【0035】先に述べた如く、外気をダクト内に取り込  
む構成とした場合、微風においても相応の冷却効果が得  
られるため、吸引ファンへの印加電圧を下げて良く、  
この分、騒音レベルを下げるができる。

【0036】吸引ファン17を、トナーが軟化するよう  
な所定温度が検出されたとき、及び、トナー貯留部5の  
トナーエンドが検出されてから、トナーエンドの状態が  
解消されるまでの間のみ、作動させるようにすると、ト  
ナーの軟化や、トナー補給容器交換時におけるトナーの  
飛散などを共に防止することができ、同時に、吸引ファ  
ン17を、のべつまなく回す必要もなくなり、騒音の  
発生時間を限定したものにできると共に、省  
電力化にもなる。

【0037】トナーエンドの検知の仕方については、例  
えば、トナー貯留部5にトナーの有無が検出可能な圧電  
センサを設けることでこと足りる。又、現像容器本体1  
2（図4）内に磁気センサを設けるようにしてもよく、  
この場合には、かかるセンサは現像剤中のトナーの濃度  
を検出し、その濃度が、いつまでたっても上がらない場  
合に、補給用トナーが無くなったものとして捉えられる  
のである。更に、トナーエンド検出手段としては、感光  
体10（図4）上にトナーによるパターン像を作像し、  
この像の濃度が上がらないときに、トナーエンドと検出  
するような手段であっても構わない。

【0038】このようなトナーエンドを検出したとき、 30  
図示されない画像形成装置のパネル操作部には、その旨  
が表示されるようになっていて、この表示を見て、前カ  
バー（不図示）を開き、トナー補給容器の新旧交換を行  
うのであるが、この交換を終え、トナーを補充したと  
き、先に述べたようなトナーエンドの状態が解消される  
のである。

【0039】なお、トナー補給容器の交換時には、飛散  
トナーを強力に吸引しなければならないので、相応の風  
量を必要とする。トナー貯留部5のトナーエンドが検出  
されてから、トナーエンドの状態が解消されるまでの  
間、吸引ファン17による空気吸引力を、これ以外のと  
きよりも、増大させるようにすると、飛散トナーを充分  
にダクト15内に吸引させることができる。

【0040】例えば、トナーの軟化を防ぐ時間内におい  
ては、吸引ファンへの印加電圧を12Vとし、トナー補  
給容器の交換時には、それを2倍の24Vとするのであ  
る。このように、吸引ファン（実際には、ファンモー  
タ）に印加する電圧を切り換えるようにしても良いので  
ある。

【0041】なお、前述した前カバーを、トナー補給容

器を交換すべく、開いたとき、適当なスイッチをオフさせ、その交換を終えて、そのカバーを閉じたとき、そのスイッチをオンさせるように構成しておく、そのスイッチのオフ時に、上記印加電圧を12Vから24Vに上げ、スイッチのオン時に、24Vから元の12Vに下げるようにすることもできる。

【0042】ファンモータの出力に余裕がある場合は、現像容器本体12の方からも風を吸引してこれを冷却してもよい。又、ファンモータを相応の出力のものにすることにより、カラー現像装置のように、複数の現像器を有するものでは、この現像器に付設される全てのトナー補給装置のダクトに対して、空気の強制的な流通を行わせることができる。この他、本例では、トナー補給容器としてカートリッジ状のものを使用した、これに限らず、ボトルタイプのトナー補給容器などを使用することができ、必ずしも、そのようなものに限定されるものではない。

【0043】

【発明の効果】本発明の請求項1に記載の現像装置によれば、トナー補給容器の交換時に、トナーを飛散させないようにすることができ、その交換部の周囲や、交換者などを、トナーで汚すようなことがなくなる。又、トナー補給部の温度が上昇しても、トナーの軟化が防止されるため、トナー補給量の低下やトナー粒子同士の熔融を防止でき、転写不良などが生じにくくなり、その温度の高低に拘らず、いつでも、良質の画像を安定して得ることができる。

【0044】請求項2に記載の現像装置によれば、トナ\*

\*トナー補給管体の冷極効果を高めることができ、内部のトナーを効率的に冷やすことができる。

【0045】請求項3に記載の現像装置によれば、トナー補給管体内のトナーの冷却効果を大きく高めることができ、吸引ファンも小容量のもので済むようになる。

【0046】請求項4に記載の現像装置によれば、トナー補給容器の交換時のトナー飛散防止効果を大きく高めることができる。

【0047】請求項5に記載の現像装置によれば、吸引ファンの騒音発生時間を限定的なものにすることができ、又、一層の省電力化にもなる。

【図面の簡単な説明】

【図1】本発明一実施例の現像装置に具備されるトナー補給管体やダクト外装部材などの構成部の断面図である。

【図2】同上構成部の側面図である。

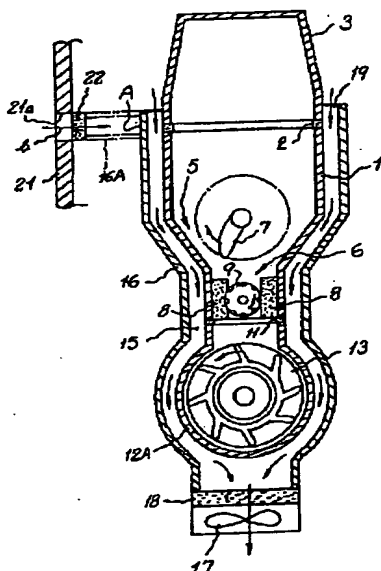
【図3】トナー補給管体に接続セットされるトナー補給容器の断面図である。

【図4】ダクト外装部材と、現像容器本体と、感光体との相互の位置関係を示す正面図である。

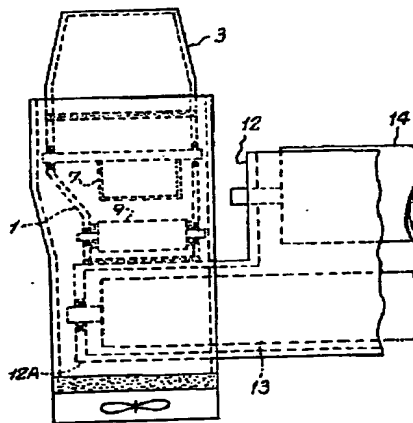
【符号の説明】

- 1 トナー補給管体
- 3 トナー補給容器
- 5 トナー貯留部
- 6 トナー供給搬送部
- 12 現像容器本体
- 15 ダクト
- 17 吸引ファン

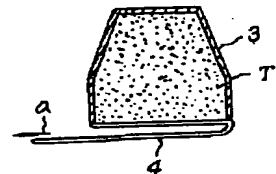
【図1】



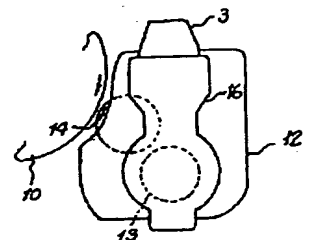
【図2】



【図3】



【図4】



フロントページの続き

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